

## **REMARKS**

Claims 1-2, 4-11, 13-18, and 20-22 are pending in the present application.

In the Office Action, claims 1-2, 4-11, and 13-16 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. The Examiner's rejections are respectfully traversed.

The Examiner alleges that the term "determined by" renders the claims indefinite because this term does not set forth a specific relationship between the periodicity of the symbols and the constraint length of the encoder. In particular, the Examiner alleges that the periodicity can be "any value under the sun." Applicants respectfully submit that the Examiner is interpreting the phrase "determined by" to mean precisely its opposite, *i.e.* "not determined by." Applicants respectfully disagree with the Examiner's interpretation of the terminology of these claims and submit that the terminology of the claims should be given their plain meaning. In the present case, Applicants submit that the phrase "determined by" should be interpreted to mean that the value of the periodicity cannot have "any value under the sun." To the contrary, the periodicity may only have values that are in some sense "determined by" the constraint length.

Applicants note that the example provided by the Examiner does not contradict this interpretation. The Examiner presented the relationship  $p=K+t$  as one possible functional relationship between a periodicity ( $p$ ), a constraint length ( $K$ ), and a number ( $t$ ). The Examiner then alleges that the value of the periodicity is unconstrained because it can take on any value. Applicants respectfully disagree. Once a value of the number ( $t$ ) has been selected, the periodicity is constrained to a value equal to the selected value of the number plus the constraint length. The periodicity is therefore determined by the constraint length. Applicants further note

that the example provided by the Examiner corresponds to one embodiment of the invention described in the specification. For example, an encoder 14 may periodically insert a zero bit into an input data sequence after every (K-1) bits, where K is the constraint length associated with the encoder 14. See Patent Application, page 11, ll. 29-35. This exemplary embodiment corresponds to the example provided by the Examiner if one assumes a value of  $t=0$ , *i.e.*, the value of the periodicity is equal to the constraint length.

For at least the aforementioned reasons, Applicants respectfully submit that claims 1-2, 4-11, and 13-16 are clear and request that the Examiner's rejections of claims 1-2, 4-11, and 13-16 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In the Office Action, claims 1-2, 4-5, 10-11, and 13 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Simanapalli (U.S. Patent No. 6,081,921). Claims 8-9 and 15-16 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Simanapalli in view of Kato, et al (U.S. Patent No. 5,436,918). The Examiner's rejections are respectfully traversed.

Independent claims 1 and 10 set forth, among other things, inserting known symbols into a digital input data sequence to form an expanded digital input data sequence. The known symbols are inserted with a periodicity determined by a constraint length of an encoder. By inserting known symbols into the digital input data sequence with a periodicity determined by a constraint length of an encoder to form the expanded digital input data sequence, the present invention may reduce the computational complexity of the channel coding system, may reduce the required memory storages, and may reduce the bit error rate. See Patent Application, page 7, ll. 16-25.

Simanapalli describes a convolutional encoder 22 that includes a bit insertion controller 28 that may interleave zero bits with input frame bits in an alternating manner. See Simanapalli, col. 3, ll. 3-18 and Figure 2. Applicants further note that Simanapalli has presented one conventional example in which the constraint length appears to be six. See Simanapalli, Figure 1 and related discussion. However, simply inserting zero bits in an alternating manner, as described in Simanapalli, does not constitute inserting bits into a digital data sequence with a periodicity determined by a constraint length of an encoder because the periodicity of the inserted bits is selected to be 2 regardless of the value of the constraint length, which in this case happens to be six. Accordingly, Applicants respectfully submit that Simanapalli is completely silent with regard to inserting bits into a digital data sequence with a periodicity determined by a constraint length of an encoder.

For at least the aforementioned reasons, Applicants respectfully submit that the present invention is not anticipated by Simanapalli and request that the Examiner's rejections of claims 1-2, 4-5, 10-11, and 13 under 35 §U.S.C. 102(b) be withdrawn.

Applicants further submit that the present invention is not obvious over the prior art of record. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. As discussed above, Simanapalli does not describe or suggest inserting bits into a digital data sequence with a periodicity determined by a constraint length of an encoder. The Examiner relies upon Kato to describe reducing a number of connections between trellis nodes in a trellis by inserting fixed bits in a bit stream. The fixed bits may be inserted near the central portion of encoding information bit data. In the case of inserting a plurality of bits, the bits may be inserted concentratedly or distributively. See Kato, col. 4, ll. 7-16 and Figures 5A-B. However, Kato is also completely

silent with regard to a constraint length. Accordingly, Kato does not describe or suggest inserting bits into a digital data sequence with a periodicity determined by a constraint length of an encoder.

The cited references also fail provide any suggestion or motivation to modify the prior art to arrive at Applicants claimed invention. To the contrary, both of the cited references teach away from the Examiner's proposed modification of the prior art. Simanapalli appears to teach away from inserting bits into a digital data sequence with a periodicity determined by a constraint length of an encoder. In particular, Simanapalli describes interleaving zero bits with input frame bits in an alternating manner, *e.g.*, inserting a zero bit after every input bit. However, the convolutional encoder described in Simanapalli appears to have a constraint length of six. See Simanapalli, Figure 1 and related discussion. Kato also teaches away from the present invention. In particular, Kato teaches that fixed bits are inserted in a data stream to reduce a residual bit error ratio for the same line bit error ratio, whereas the present invention teaches periodically inserting known symbols to reduce the line bit error ratio. It is by now well established that teaching away by the prior art constitutes *prima facie* evidence that the claimed invention is not obvious.

For at least the aforementioned reasons, Applicants respectfully submit that the present invention is not obvious over Simanapalli in view of Kato and request that the Examiner's rejections of claims 8-9 and 15-16 under 35 U.S.C. §103(a) be withdrawn.

Claims 17-18 and 20-22 have been allowed. The Examiner has indicated that claims 6-7 and 14 include allowable subject matter. Claims 6-7 depend from independent claim 1 and claim 14 depends from independent claim 10. Applicants therefore submit that claims 6-7 and 14 are allowable for at least the reasons discussed herein with regard to independent claims 1 and 10.

For the aforementioned reasons, it is respectfully submitted that all claims pending in the present application are in condition for allowance. The Examiner is invited to contact the undersigned at (713) 934-4052 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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